

**J-1502000-14**  
**Emergency Generator Maintenance Data**  
**at the**  
**Walter Reed National Military Medical Center (WRNMMC)**

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**J-1502000-14 Electric Generators - Inventory  
at the  
Walter Reed National Military Medical Center  
(WRNMMC)**

<b>Generator Location</b>	<b>Area</b>	<b>PM I.D.No.</b>
001	Hospital	MOO767
001	Hospital	MO3040
007	Hospital	MO3837
011	IT	MO15829
045	AFRRI	MO3655
047	AFRRI	MO2919
052	Lodge	MO15828
053	Call Center	M01664
054	Parking Garage	MOO841
055	Parking Garage	MOO458
055	Parking Garage	MOO455
055	Parking Garage	MOO456
055	Parking Garage	MOO457
070	USUHS	MO2901
071	USUHS	MO2904
072	USUHS	MO2902
139	NMRI	MO15830
202	Fire House	MO5827
202	Substation	MOO 778

**J-1502000-14 Electric Generators - Maintenance Check List at the Walter Reed National Military Medical Center (WRNMMC)**

Generators shall be load tested by transferring the load from normal power to emergency power and letting the generator carry the load. This procedure shall test the automatic operation of transfer switches if applicable. Items needing servicing shall be corrected and a record of date and description of trouble, maintenance performed, test run, etc. recorded in a log book that will be maintained at each site. Fuel levels shall be checked weekly and recorded for each generator fuel tank with fuel levels reported to the WRNMMC Facility Staff. Drain water or sediment while visually checking for fuel contamination. Check for evidence of fuel leaks at fuel tank/fuel tank lines and repair as necessary. Test operation of control panel lamps. Inspect for and correct loose components, terminal screws or soldered connections.

(See Form Following Two Pages)

Maintenance Schedule Generator #:		Inspection Date:		
Component (as applicable)	Freq- uency	Action	Certification (initials required)	Comments
<b>1. Fuel</b>				
(a) Main supply tank level	W	Check		
	W	Check		
(c )Day tank float switch	W	Check and Test		
(d) Supply or transfer pump operation	W	Check and Test		
(e) Solenoid valve operation	W	Check and Test		
(f) Strainer, filter, dirt leg, or combination	m	Clean		
(g) Water in system	W	Check and Clean		
(h) Flexible hose and connectors	W	Check and Replace (if necessary)		
(l) Tank vents and overflow piping obstructed	A	Check and Test		
(j) Piping	A	Check		
(k) Fuel in main tank (when used)	A	Check and notify WRNMMC Facility Staff		
<b>2. Lubrication System</b>				
(a) Oil level	W	Check		
(b) Oil change	A	Replace (if necessary)		
(c )Oil filter(s)	A	Change		
(d) Lube oil heater	W	Check		
(e) Crankcase breather	m	Check, Clean, Replace (if necessary)		
<b>3. Cooling System</b>				
(a) Level	W	Check		
(b) Antifreeze protection level	S	Test		
(c )Antifreeze	A	Change		
(d) Adequate cooling water to heat exchanger	W	Check		
(e) Rod out heat exchanger	A	Clean		
(f) Adequate fresh air through radiator	W	Check		
(g) Clean exterior of radiator	A	Clean		
(h) Fan and alternator belt	M	Check		
(l) Water pump(s)	W	Check		
(j) Condition of flexible hoses and connection	W	Check		
(k) Jacket water heater	W	Check		
(l) Inspect duct work, clean louvers	A	Check and Change		
(m) Louver motors and controls	A	Check, Clean and Test		
<b>4. Exhaust System</b>				
(a) Leakage	W	Check		
(b) Drain condensate trap	W	Check		
(c ) Insulation and fire hazards	m	Check		
(d) Excessive backpressure	A	Test		
(e) Exhaust system hangers and supports	A	Check		
(f) Flexible exhaust section	m	Check		
<b>5. Battery System</b>				
(a) Electrolyte level	W	Check		
(b) Terminals clean and tight	m	Check		

(c ) Remove corrosion, case exterior clean and dry	M	Check and Clean		
(d) Specific gravity or state of charge	M	Test		
(e) Charger and charge rate	M	Check		
(f) Equalize Charge	M	Check		
<b>6. Electrical System</b>				
(a) General inspection	W	Check		
(b) Tighten control and power wiring connections	A	Check		
(c ) Wire chafing where subject to movement	m	Check		
(d) Operation of safeties and alarms	m	Check and Test		
(e) Boxes, panels, and cabinets	m	Clean		
(f) Circuit breakers, fuses	M	Check, Clean, Test, and Replace (if necessary)		
(g) Transfer switch main contacts	A	Check and Clean		
(h) Calibration of voltage-sensing relays/devices	A	Check and Test		
(l) Wire insulation breakdown	A	Test (See note A)		
<b>7. Prime Mover</b>				
(a) General inspection	W	Check		
(b) Service air cleaner	m	Clean and Change		
(c ) Governor oil level and linkage	M	Check		
(d) Governor oil	A	Change		
(e) Ignition system-plugs, points, coil, cap, rotor, secondary wire insulation	A	Check, Clean, Test, and Replace (if necessary)		
(f) Choke setting and carburetor adjustment	m	Check		
(g) Injector pump and injectors for flow rate pressure, and/or spray pattern	A	Test		
(h) EPS at minimum of 80% nameplate rating	A	Test (See note C)		
(l) Valve clearance	A	Test (See note B)		
(j) Torque bolts	A	Test (See note B)		
<b>8. Generator</b>				
(a) Electrolyte level	W	Check		
(b) Brush length, appearance, free to move in holder	m	Check and Change		
(c ) Commutator and slip rings	A	Check and Change		
(d) Rotor and stator	A	Check and Change		
(e) Bearing(s)	A	Check and Replace (if necessary)		
(f) Bearing grease	A	Check and Replace (if necessary)		
(g) Exciter	A	Check and Clean		
(h) Voltage regulator	A	Check and Clean		
(l) Measure and record resistance readings of windings with insulation tester (Megger)	A	Test		
<b>9. General</b>				
(a) General condition of EPSS, any unusual condition of vibration, leakage, noise, temperature, or deterioration	W	Check and Clean		
(b) Service room or housing housekeeping	W	Check and Clean		
<b>10. Restore system to automatic operation condition</b>	W	Check		
Note A: Every 5 years or 500 hours				
Note B: Every 3 years or 300 hours				
Note C: Every 3 years for 4 hours				

# **WRNMMC MONTHLY EMERGENCY DIESEL GENERATOR**

## **TEST OVERVIEW**

Per JCAHO requirements, Emergency Generators and all Automatic Transfer Switches (ATSs) serving Healthcare Occupancies are to be tested every 20-40 days for at least 30 minutes with at least 30% load. This test procedure fulfills those requirements.

This procedure should be followed for the testing of the emergency power system that serves the Healthcare Occupancy in Buildings 9 and 10. The order of this procedure is designed to test all portions of the emergency power system and minimize possibilities of equipment damage. The sequence of events is very important and will require good communication and coordination between personnel involved.

The Monthly Generator Test Roster will be approved by the WRNMMC Hospital Engineer at least three (3) working days prior to the test. The training sign off sheet included in this procedure will be submitted with the roster each month.

A brief overview of starting the test is as follows:

- 1) There are 21 Normal Power Breakers in Building 9, Rooms 0201, 0314, 0604, and 1203. Each of the breakers will start one of the 4 Emergency Diesel Generators in Bldg 55 basement. Prior to the test, 4 Normal Power Breakers will be chosen on a rotating basis as the breakers that will start each of the generators. Breakers will be opened to start the test.
- 2) Once the four initial breakers are opened, continue with manually opening the remainder of the Normal Power Breakers to activate the remainder of the ATSs.
- 3) Monitor all ATSs, generators and building areas while under the emergency power conditions. Verify that mechanical equipment in Buildings 9 and 10 is running under emergency power.

Returning the power system to normal shall be:

- 1) Bldg 9, Room 0201, Emergency Switchboard: Open motor control center emergency breakers.
- 2) Close all Normal Breakers that were opened.
- 3) Close all motor control center emergency breakers.
- 4) Make sure all ATSs have returned to normal.
- 5) Verify that mechanical equipment in Buildings 9 and 10 is running under normal power.

At the completion of the test, turn in all paperwork documenting the test to the WRNMMC Facilities Management Department (FMD) Hospital Engineer within 24 hours, including documentation of any faults that require repair.

## **Before the Test:**

### **1) 3 days before EDG Test:**

- a) Fill out the test roster with names of qualified personnel and turn in to the WRNMMC Hospital Engineer. Personnel operating Electrical Circuit Breakers will be qualified electricians.
- b) Select four (4) Normal Power Breakers that will be used to start generators during the test
- c) Review previous EDG Tests for items requiring repair or attention. Perform repairs as needed under FMD direction.

### **2)**

- Breakers to start test selected
- Personnel on site
- Communications check sat
- Title V Training complete and documented
- 

### **0545 – Muster all personnel in Bldg 55 EDG Room and conduct in-brief.**

- Annotate roster sheet that all personnel are present. Assign substitutes as needed. Provide check sheets for each position (ATS Lists and “Equipment Running (Emergency and Normal Power) Forms
- Verify which 4 circuit breakers to be used to start the test.
- Assign radio or phone communications between Bldg 55 EDG Room, and Bldg. 9 Rooms 0201, 0314, 0604, and 1203.
- Personnel post to stations indicated on roster sheet.
- Bldg 55 EDG Room – Perform “Weekly Generator Check” (approx. 30 minutes duration). Document results on “Weekly Generator Check” form.
- Conduct Title V Training and document.

TEST DATE: \_\_\_\_\_

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## **WRNMMC MONTHLY EMERGENCY DIESEL GENERATOR (EDG) TEST DETAILED TEST PROCEDURES**

**0615** – Perform communications check with all stations.

Verify that:

- Bldg 55 EDG Room: Individual generator control board selector switch is set to 'auto'
- Bldg 55 EDG Room: Input / Output breakers for each generator on switchboard (at bottom) are 'CLOSED'
- Bldg 55 EDG Room: Tie breakers for each generator on switchboard (at middle) are 'OPEN'
- Bldg 9, Room 0201 – check each breaker on emergency switchboard; breakers are to be 'CLOSED'
- Bldg 9, Room 0201 – on end of generator switchboard - Check annunciator panel by pressing the 'test' button – all lights should come on.

**0620** – Make announcement in hospital. Representative is at Bldg 10 CDO desk to coordinate announcement.

**0625** – Make final announcement in Hospital.

**0630** – Open four (4) selected breakers to bring the generators on line  
(Used to be Substation #1, breakers #52-16 ATS 1600; #52-17 ATS 1700 and #52-14 ATS 1400. 2) Substation 32, breaker #52-23 ATS 2300)

**0633** – proceed with opening 17 normal power breakers, allowing several seconds between each:

- 1) Substation #1, breaker #52-13 ATS 1300
- 2) Substation #2, breakers #52-27 ATS 2700, #52-52 ATS 2500, and #52-24 ATS 2400
- 3) Substation #3, breakers #52- 34 ATS 3400, #52-38 ATS 3800, and #52-37 ATS 3700
- 4) Substation #4, breakers #52-44 ATS 4400, #52-46 ATS 4600, #52-45 ATS 4500 and #52-43 ATS 4300, #52-41 ATS 4100.
- 5) Distribution switchboard #3100, Breakers 3100-3 ATS 3130 and 3100-2 ATS 3120. This switchboard is located in room 0604 Bldg 9, assigned personnel "TR-2" should do this.



6) Distribution switchboard #1500, breakers 1500-3 ATS 1530 and 1500-4 ATS 1540. This switchboard is located in room 0314 Bldg 9, assigned personnel in TR-1 should do this.

7) Distribution board (DSWB 2600) is located in room 1203 Bldg 9 (2600-4 ATS 2640), an assigned helper should do this

**0634** – Check Bldg 10 room 0301 Air Handlers, Bldg 10 penthouses Air Handlers, Bldg 9 Room 0220, Bldg 9 Room 3200 and 3700.

**0635** – After this is completed, the total emergency power system will be in operation. Personnel in the generator room shall take recordings of each generator for engine vitals, start/stop times and load reading. Any problems arising should be relayed to “Maintenance Control” by field personnel or hospital employees. Allow emergency power system to run for 30 minutes, then start procedure for return to normal power.

TEST DATE: \_\_\_\_\_

Ver.1.0 03May2006

## **WRNMMC MONTHLY EMERGENCY DIESEL GENERATOR (EDG) TEST DETAILED TEST PROCEDURES**

**0710** – Open emergency switchboard breakers: E-30-  
2 ATS 2300  
E-20-3 ATS 1400  
E-40-3 ATS 4500  
E-40-6 ATS 4300  
E-40-2 ATS 2400  
(allows motors to decrease speed prior to switching back to normal power)

**0712** – Close these normal breakers:  
Bldg 9, Room 0201 - Substation 1: 52-16, 52-17, 52-14  
Substation 2: 52-23, 52-24

**0714** - Proceed to close the 16 Normal Power Breakers that have been opened at the start of the test. Allow several seconds between each one. After these steps have been done, ATSs should start restoring themselves to the normal position. Timer settings vary on each one from 5 to 30 minutes once normal power is restored to them.

- Bldg 9, Room 0201 - Close all emergency board breakers after the test is completed.

- Continue to take readings on Bldg 55 generators as long as there is load on the generators. Once all ATSs on one generator are back to “normal”, generators are on automatic relays to shut down.

**0740** – Continue monitoring Title V emissions requirements until all generators secure and test is complete.

**0740** – Conduct the “Equipment Running Under Normal Power” Checks to verify all critical equipment continues to operate under normal power.

Includes:

Bldg 9, Room 0220

Bldg 9, Room 3200

Bldg 9, Room 3700

Bldg 9, Penthouse (Anesthesia Exhaust)

Bldg 10, Room 0103

Bldg 10, East and West Penthouses

Check air handlers in Bldg 10, 0301, Bldg 9 0220 (all machinery), Air handlers in Bldg 9 rooms 3200 and 3700 per check sheets.

TEST DATE: \_\_\_\_\_

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## **WRNMMC MONTHLY EMERGENCY DIESEL GENERATOR (EDG) TEST DETAILED TEST PROCEDURES**

**Within 24 hours of test completion:** Fill in all paperwork listed below, and turn in to WRNMMC FMD Hospital Engineer:

- 1) WRNMMC Monthly EDG Test Overview Sheet
- 2) Detailed Test Procedures, initialed as needed
- 3) Title V Brief Sheet
- 4) Personnel Assignments
- 5) EDG Pre-Start Checklists for Generators 1-4
- 6) Generator Readings During Test, Generators 1-4
- 7) ATS Test Sheet, initialed, for all 21 ATSs
- 8) Equipment "Running" Check Sheets on Emergency and Normal Power:  
Technician will inspect equipment and initial sheets that equipment is running both during the test (on Emergency Power) and after the test is complete (on Normal Power).
  - Bldg 9, Room 0220
  - Bldg 9, Room 3200
  - Bldg 9, Room 3700
  - Bldg 9, Penthouse (Anesthesia Exhaust)
  - Bldg 10, Room 0103
  - Bldg 10, East and West Penthouses
- 9) Monthly EDG Test "Training Elements" Pre-Brief Sheet

TEST DATE: \_\_\_\_\_

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## **WRNMMC MONTHLY EMERGENCY DIESEL GENERATOR TEST EMERGENCY RESPONSE PROCEDURES**

### **Abort the Test if:**

- a) Any one of the generators fails to start.
- b) There is a major malfunction of any one generator – excess exhaust smoke, unusual noise or vibration in the generator, major fuel or oil leak.

### **Other Situations:**

If any one of the ATSs fails to switch from “Normal” to “Emergency” power once emergency power is available, the location where the ATS fails contacts the Test Director in Bldg 9 Room 0201. The Technician at the location of the faulty ATS then re-switches the primary power breaker back to ‘NORMAL” to bypass the operation of that particular ATS, and the test can continue. Make note of the failed ATS for after-action report and repair.

If air handlers or other equipment are discovered to be not operating during the test, technician who discovers the fault reports to the Test Director in Bldg 9 Room 0201. The Test Director directs troubleshooting. Note faults for after-action report and for repair.

### **Items to be Aware Of:**

Individuals verifying if equipment is running in mechanical rooms must have the ability to re-start the equipment.

Elevators – ELCON assist with determining that generator test is running?

Develop a list of what breakers feed what generators

Develop a schedule of what breakers are opened for each test

Generator training checklist?

ATS 1400 had difficulty switching from emergency to normal power

Air Handlers in Bldg 10, basement (Room 0103) – six (6) air handlers tend to trip off line when switching from “normal” to “emergency” power. These air handlers will need to be re-started after generators come on line and after generators are secured.

TEST DATE: \_\_\_\_\_

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## WRNMMC MONTHLY EMERGENCY DIESEL GENERATOR TEST

### PERSONNEL ASSIGNMENTS

#### **Assignments:**

- Bldg 55, generator room  
    1 electrician  
    1 mechanic  
Name: \_\_\_\_\_  
Name: \_\_\_\_\_
- Bldg 9, Room 0201  
    1 high voltage electrician  
        – in charge of test  
    1 electrician  
Name: \_\_\_\_\_  
Name: \_\_\_\_\_
- Bldg 9, Room 0314  
    1 electrician  
Name: \_\_\_\_\_
- Bldg 9, Room 0604  
    1 electrician  
Name: \_\_\_\_\_
- Bldg 9, Room 1203  
    1 electrician  
Name: \_\_\_\_\_
- Bldg 10 CDO Desk  
    1 individual  
Name: \_\_\_\_\_
- Bldg 9, Room 0220 (mechanical room) – use checklist to verify machinery running  
    1 Mechanic (use electrician from 0201?) Name: \_\_\_\_\_
- Bldg 10, Room 0103  
    1 Electrician – rover from 0201 – use checklist to verify air handlers running  
Name: \_\_\_\_\_
- Bldg 10, Room Penthouses x 2 – verify air handlers running  
    1 technician  
Name: \_\_\_\_\_
- Bldg 9, Room 3200 and 3700 – use checklists to verify air handlers running  
    1 technician  
Name: \_\_\_\_\_

**BUILDING 9 & 10  
MONTHLY GENERATOR TEST**

TEST DATE\_\_\_\_\_

START TIME\_\_\_\_\_

**TEST ROSTER**

	<b>INITIAL</b>	<b>DATE</b>
SUBMITTED AND APPROVED	_____	_____

**GENERATOR TEST CHECKLIST**

TEST COMMUNICATION SYSTEM BETWEEN SITES	_____	_____
WATCH ROSTER QUALIFIED AND ROTATED	_____	_____
BATTERY SPECIFIC GRAVITY TESTED	_____	_____
PREVIOUS MONTHS TEST REVIEWED	_____	_____
SWITCHES/TIES LEFT IN NORMAL POSITION	_____	_____
GENERATORS FUEL LEVEL CHECKED	_____	_____
GENERATORS CHECKED FOR WET STACKING	_____	_____
TEST SUMMARY ATTACHED	_____	_____

MONTHLY TESTING SHALL BE CONDUCTED ON THE LAST MONDAY OF THE MONTH AT 0630 TO 0730 UNLESS THIS DAY FALLS ON A HOLIDAY WHERE THE TEST WILL BE PERFORMED ON THE NEXT NORMALLY SCHEDULED WORK DAY.

ELECTRICAL FOREMAN \_\_\_\_\_ DATE\_\_\_\_\_

GENERAL FOREMAN \_\_\_\_\_ DATE\_\_\_\_\_

**J-1502000-14 Emergency Generators (JCAHO) Emergency Generator Log**  
**at the**  
**Walter Reed National Military Medical Center (WRNMMC)**

Generators shall be load tested by transferring the load from normal power to emergency power and letting the generator carry the load. This procedure shall test the automatic operation of transfer switches if applicable. Items needing servicing shall be corrected and a record of date and description of trouble, maintenance performed, test run, etc. recorded in a log book that will be maintained at each site. Fuel levels shall be checked weekly and recorded for each generator fuel tank with fuel levels reported to the WRNMMC Facility Staff. Drain water or sediment while visually checking for fuel contamination. Check for evidence of fuel leaks at fuel tank/fuel tank lines and repair as necessary. Test operation of control panel lamps. Inspect for and correct loose components, terminal screws or soldered connections.

Four of WRNMMC's Emergency Diesel Generators (Bldg.55) are under JCAHO- specific maintenance and are tested 12 times each year.

**EMERGENCY ELECTRICAL POWER**

THE EMERGENCY ELECTRICAL POWER SYSTEM CONSISTS OF 4 DIESEL POWERED 750 KV, 480 VOLT GENERATORS LOCATED IN THE LOWER SOUTHEAST CORNER OF THE SOUTH PARKING STRUCTURE, BUILDING 55.

TWENTY (20) AUTOMATIC TRANSFER SWITCHES FOR SWITCHING BETWEEN NORMAL AND EMERGENCY POWER AS NECESSARY ARE LOCATED THROUGHOUT BUILDINGS 9 AND 10. VOLTAGE SENSING RELAYS CONTINUOUSLY MONITOR THE PRESENCE OF NORMAL POWER AT THE SWITCHES. UPON LOSS OF POWER THESE RELAYS SIGNAL THE APPROPRIATE GENERATOR TO START AND SWITCH OVER THEIR LOAD TO THE EMERGENCY FEEDER. THIS WILL CAUSE LOSS OF ALL ELECTRICAL EQUIPMENT AND LIFE SAFETY POWER CIRCUITS TO BE DEENERGIZED AND ONLY EQUIPMENT AND LIFE SAFETY BRANCH CIRCUITS TO CONTINUE ENERGIZED. INFORMATION ON THESE CIRCUITS AND THEIR GENERAL USE CAN IS FOUND IN THIS SECTION, ELECTRICAL DISTRIBUTION SYSTEM. TO PREVENT OVERLOAD OF THE EMERGENCY GENERATORS UPON ACTIVATION THE AUTOMATIC TRANSFER SWITCHES ARE STAGGERED INTO SWITCHING BY PRIORITIES OF THE LOAD SERVED.

(See Form Next Page)

# WALTER REED NATIONAL MILITARY MEDICAL CENTER EMERGENCY GENERATOR LOG

				GEN 1		GEN 2		GEN 3		GEN 4	
TEST DATE: _____		START TIME									
OPERATOR: _____		STOP TIME									
		GEN #1		GEN #2		GEN #3		GEN #4			
HOUR METER	START										
	STOP										
BATTERY SPECIFIC GRAVITY	HIGH										
	LOW										
	HIGH										
	LOW										
OIL LEVEL HIGH/NORM/LOW											
OIL PRESSURE											
ENGINE WATER TEMP											
GENERATOR LOAD AMPS (A)											
(B)											
(C)											

NORMAL OPERATING CONDITIONS:

WET STACKING OBSERVED: YES \_\_\_\_\_

NO \_\_\_\_\_

OIL TEMP + 180-225 DEGREES (F)

STATIC WATER TEMP = 80-125 DEGREES (F)

WATER TEMP = 170-195 DEGREES (F)

STATIC OIL TEMP = 80-120 DEGREES (F)

OIL PRESSURE AT 225 DEGREES (F)

=PSI AT IDLE

=45 PSI AT 1800 RPM

\*READING SHALL BE TAKEN AT 15 MINUTE INTERVALS



**J-1502000-14**  
**Electric Generators Fuel Requirements**  
**at the**  
**Walter Reed National Military Medical Center**  
**(WRNMMC)**

Fuel levels shall be checked weekly and recorded for each generator fuel tank with fuel levels reported to the WRNMMC Facility Staff. Drain water or sediment while visually checking for fuel contamination. Check for evidence of fuel leaks at fuel tank/fuel tank lines and repair as necessary.

(See Form Next Page)

Applicable Generator Tanks:

Building	Size (Gallons)	Before Top-Off		After Top-Off	
		Inches	Gallons	Inches	Gallons
053	1000	_____	_____	_____	_____
070a	1000	_____	_____	_____	_____
070b	2000	_____			
042a	1000	_____			
042b	2319	_____			
001	1000	_____			
007	6000	_____			
054	1000	_____			
055n	4000	_____			
055s	4000	_____			
139	100	_____			
241	350	_____			
020	?	_____			
011	?	_____			
202	?	_____			
052	?	_____			

Mechanic: \_\_\_\_\_

Date: \_\_\_\_\_